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EXAMINER

FULLER, ERIC B

ART UNIT PAPER NUMBER

1762

DATE MAILED: 06/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/905,286

Applicant(s)

BASCERI ET AL.

Examiner

Eric B Fuller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,6-8,11-22 and 24-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,6-8,11-22 and 24-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>23</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Request for Continued Examination

The request filed on May 28, 2003 for Continued Examination (RCE) under 37 CFR 1.114 based on parent Application No. 09/905,286 is acceptable and an RCE has been established. An action on the RCE follows.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 11-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicant has added, by amendment, "an amount of titanate incorporated into the dielectric layer differing from an amount that would be incorporated in the absence of the H₂O under otherwise identical conditions". This "under otherwise identical conditions" is vague. It is unclear if the applicant is comparing the claimed process with one that uses only one type of oxidizer that is not water, while the total amount of oxidizer is constant, or if the applicant is comparing with an embodiment where the amount of the "other oxidizer" is constant and the use of water is omitted, thus the total amount of oxidizer is different. The specification does not clear up this confusion.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 6-8, 11-22, and 24-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kirlin et al. (US 5,711,816) in view of Senzaki et al. (US 6,238,734 B1).

Kirlin teaches a process where a barium strontium titanate comprising dielectric layer is produced on a substrate (column 13, lines 7-32). The process is performed by an MOCVD process that utilizes Ba(thd)₂, Sr(thd)₂, Ti(O-I-Pr)(thd)₂ and an oxidizing co-reactant (oxygen) as the precursors (column 14, lines 11-15). As the precursors are mixed with the oxidizer and the method is a CVD processes, as opposed to an ALD process or sequential CVD process, it is implied to one of ordinary skill in the art that at least at some point during the process, the oxidizer and precursors are being fed at the same time, which reads on "simultaneously". It is taught to vary the Ba/Sr ratio in the deposited film (column 13, lines 25-32). Kirlin fails to teach using water or hydrogen peroxide as the oxidizer.

Senzaki teaches suitable oxygen sources for mixture with metalorganic precursors for performing chemical vapor deposition of mixed metal oxide films are oxygen, ozone, nitrous oxide, nitric oxide, nitrogen dioxide, water, hydrogen peroxide, air, and mixtures thereof (column 3, lines 40-43 and 57). It would have been obvious at

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the time the invention was made to a person having ordinary skill in the art to use the oxygen sources of Senzaki as the oxidizing agent of Kirlin with a reasonable expectation of success, as both references act to deposit mixed metal oxide films from metalorganic precursors.

As to claims 3, 8, and 31, deposition temperature has an effect of uniformity of the film and deposition rate. It would have been within the skill of one the uniformity of the film and deposition rate are within desirable ranges.

As to claim 11, to use the same amount of other oxidizer with the same deposition time and temperature (thus total oxidizer is reduced by omitting water), the deposited layer would inherently have a different amount of titanate in it.

As to claim 18, the presence of hydrogen peroxide or water would inherently influence the amount of titanate incorporated into the layer, as the presence of any oxidizer has an influence.

Claims 1-3, 6-8, 11-22, and 24-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kirlin et al. (US 5,711,816) in view of DiMeo, Jr. et al. (US 5,972,430).

Kirlin teaches a process where a barium strontium titanate comprising dielectric layer is produced on a substrate (column 13, lines 7-32). The process is performed by an MOCVD process that utilizes Ba(thd)₂, Sr(thd)₂, Ti(O-I-Pr)(thd)₂ and an oxidizing co-reactant (oxygen) as the precursors (column 14, lines 11-15). As the precursors are mixed with the oxidizer and the method is a CVD processes, as opposed to an ALD

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process or sequential CVD process, it is implied to one of ordinary skill in the art that at least at some point during the process, the oxidizer and precursors are being fed at the same time, which reads on "simultaneously". It is taught to vary the Ba/Sr ratio in the deposited film (column 13, lines 25-32). Kirilin fails to teach using water or hydrogen peroxide as the oxidizer.

However, Dimeo, Jr. et al. teaches that suitable oxidizers for depositing BST films onto substrates are oxygen, ozone, nitrous oxide, nitric oxide, nitrogen dioxide, water vapor, hydrogen peroxide vapor, and mixtures thereof (column 9, lines 1-4). Therefore it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize such oxidation mixtures in the process taught by Kirilin with a reasonable expectation of success, as both references act to deposit BST films from metalorganic precursors.

As to claims 3, 8, and 31, deposition temperature has an effect of uniformity of the film and deposition rate. It would have been within the skill of one the uniformity of the film and deposition rate are within desirable ranges.

As to claim 11, to use the same amount of other oxidizer with the same deposition time and temperature (thus total oxidizer is reduced by omitting water), the deposited layer would inherently have a different amount of titanate in it.

As to claim 18, the presence of hydrogen peroxide or water would inherently influence the amount of titanate incorporated into the layer, as the presence of any oxidizer has an influence.

Claims 11 – 22, 24, and 29 – 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stauf et al. (US 6,277,436 B1) in view of Senzaki et al. (US 6,238,734 B1).

Stauf teaches a process where a barium strontium titanate comprising dielectric layer is produced on a substrate. The process is performed by an MOCVD process that utilizes Ba(thd)₂, Sr(thd)₂, Ti(O-*i*-Pr)(thd)₂ and an oxidizing co-reactant as the precursors (column 6, lines 55-65; column 8, lines 23-25; column 9, line 65, to column 10, line 10). The substrate is held at 400 – 1200 degrees Celsius by the use of a susceptor (column 8, lines 25-30). The precursors are provided as a combined feed (column 7, lines 40-45) and are mixed with an oxidizing gas in the chemical vapor deposition reactor (column 4, lines 20-29). As the precursors are mixed with the oxidizer and the method is a CVD processes, as opposed to an ALD process or sequential CVD process, it is implied to one of ordinary skill in the art that at least at some point during the process, the oxidizer and precursors are being fed at the same time, which reads on “simultaneously”. Stauf discloses that the oxidizing co-reactant can be “any suitable type providing an oxygen containing environment in which the high dielectric metal oxide film is formed on the substrate” (column 8, lines 23-26), but does not explicitly disclose applicant's claimed oxidizing species.

Senzaki teaches suitable oxygen sources for mixture with metalorganic precursors for performing chemical vapor deposition of mixed metal oxide films are oxygen, ozone, nitrous oxide, nitric oxide, nitrogen dioxide, water, hydrogen peroxide, air, and mixtures thereof (column 3, lines 40-43 and 57). It would have been obvious at the time the

invention was made to a person having ordinary skill in the art to use the oxygen sources of Senzaki as the oxidizing co-reactants of Stauf as all of the oxygen sources contain oxygen and hence would meet the requirement of Stauf for the oxidizing co-reactant of "providing an oxygen-containing environment".

As to claim 11, to use the same amount of other oxidizer with the same deposition time and temperature (thus total oxidizer is reduced by omitting water), the deposited layer would inherently have a different amount of titanate in it.

As to claim 18, the presence of hydrogen peroxide or water would inherently influence the amount of titanate incorporated into the layer, as the presence of any oxidizer has an influence.

Claims 11-22, 24, and 29 – 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stauf et al. (US 6,277,436 B1) in view of DiMeo, Jr. et al. (US 5,972,430).

Stauf teaches a process where a barium strontium titanate comprising dielectric layer is produced on a substrate. The process is performed by an MOCVD process that utilizes Ba(thd)₂, Sr(thd)₂, Ti(O-I-Pr)(thd)₂ and an oxidizing co-reactant as the precursors (column 6, lines 55-65; column 8, lines 23-25; column 9, line 65, to column 10, line 10). As shown above, the precursors and oxidizer are fed simultaneously. The substrate is held at 400 –1200 degrees Celsius by the use of a susceptor (column 8, lines 25-30). Stauf discloses that the oxidizing co-reactant can be "any suitable type providing an oxygen containing environment in which the high dielectric metal oxide film

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is formed on the substrate" (column 8, lines 23-26), but does not explicitly disclose applicant's claimed oxidizing species.

However, Dimeo, Jr. et al. teaches that suitable oxidizers for depositing BST films onto substrates are oxygen, ozone, nitrous oxide, nitric oxide, nitrogen dioxide, water vapor, hydrogen peroxide vapor, and mixtures thereof (column 9, lines 1-4). Therefore it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize such oxidation mixtures in the process taught by Stauf with a reasonable expectation of success. It is noted that DiMeo, Jr. discloses a "digital" process wherein the BST precursors are first deposited and then oxidized (an ALD process). Regardless, the oxidizing agents of DiMeo, Jr. would all clearly meet the requirement of Stauf for the oxidizing co-reactant of "providing an oxygen-containing environment in which the high dielectric film is formed", as all of these species are oxidizers that contain oxygen atoms.

As to claim 11, to use the same amount of other oxidizer with the same deposition time and temperature (thus total oxidizer is reduced by omitting water), the deposited layer would inherently have a different amount of titanate in it.

As to claim 18, the presence of hydrogen peroxide or water would inherently influence the amount of titanate incorporated into the layer, as the presence of any oxidizer has an influence.

Response to Arguments

Applicant argues that the prior art of reference fails to teach varying the barium to strontium ratio in the deposited film, as has been added by amendment to independent claims 1 and 6. Examiner agrees and has withdrawn the rejections of the previous Office Action accordingly. Applicant's arguments are moot in view of the new grounds of rejection.

Applicant argues that the prior art fails to teach "utilizing an oxidizer comprising water to affect titanate incorporation", as pertinent to claims 11 and 18. This argument is not found persuasive. The claims do not read to use the oxidizer such that the titanate incorporation is altered. The claims simply read to use the oxidizer and the oxidizer has the effect of influencing the titanate amount in the film. It has been shown obvious to use the oxidizer claimed and the property of the oxidizer influencing the amount of titanate in film. Specifically to claim 11, the claim is written such that it is not understood what "under otherwise identical conditions" entails. Using less oxidizer inherently, and obviously, affects the amount of titanate deposited. As to claim 18, all oxidizers "influence" the amount of titanate incorporated in the deposited layer as they are used to react with the titanium precursors.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (703) 308-6544. The examiner can normally be reached on Mondays through Thursdays.

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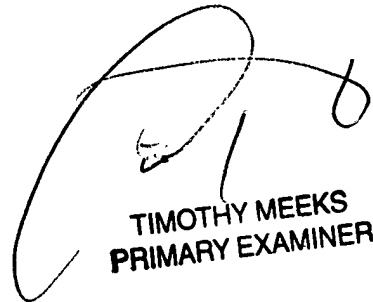
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck, can be reached at (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



EBF

June 13, 2003



TIMOTHY MEEKS
PRIMARY EXAMINER